Human and mouse adipose-derived cells support feeder-independent induction of pluripotent stem cells.

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Public Summary:
Here we report on the use of human adipose tissue, more commonly known as fat tissue, as a promising and viable source to generate patient specific human pluripotent stem cell lines (iPS). The use of human adipose tissue as a starting source for human cells capable of being reprogrammed was also reported by another California-based research group during preparation of our work for publication which confirms the viability as a source for reprogramming to iPS. In this publication we report on significant findings that, 1) these cells are much more efficient to be reprogrammed than the skin biopsy cells that have been previously reported, 2) these cells can be reprogrammed to iPS (stem cell) lines without the use of animal products commonly used in stem cell culture, like mouse-feeder cells or bovine growth media products. We discuss our findings on why these fat-sourced cells appear to be more amenable to reprograming. This represents an advancement towards identifying reliable and obtainable sources of human cells that show good efficiency to be converted in to iPS stem cells without reliance on the xenobiotic (animal sourced) products that are commonly used in previously reported efforts. In a broader context this moves the field of stem cell-based therapeutics closer to feasibility for human based clinical trials.

Scientific Abstract:
Although adipose tissue is an expandable and readily attainable source of proliferating, multipotent stem cells, its potential for use in regenerative medicine has not been extensively explored. Here we report that adult human and mouse adipose-derived stem cells can be reprogrammed to induced pluripotent stem (iPS) cells with substantially higher efficiencies than those reported for human and mouse fibroblasts. Unexpectedly, both human and mouse iPS cells can be obtained in feeder-free conditions. We discovered that adipose-derived stem cells intrinsically express high levels of pluripotency factors such as basic FGF, TGFbeta, fibronectin, and vitronectin and can serve as feeders for both autologous and heterologous pluripotent cells. These results demonstrate a great potential for adipose-derived cells in regenerative therapeutics and as a model for studying the molecular mechanisms of feeder-free iPS generation and maintenance.

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